



Northeast Asia Economic Forum

March 23, 2010

Clean Energy Strategies for Hawaiian Electric

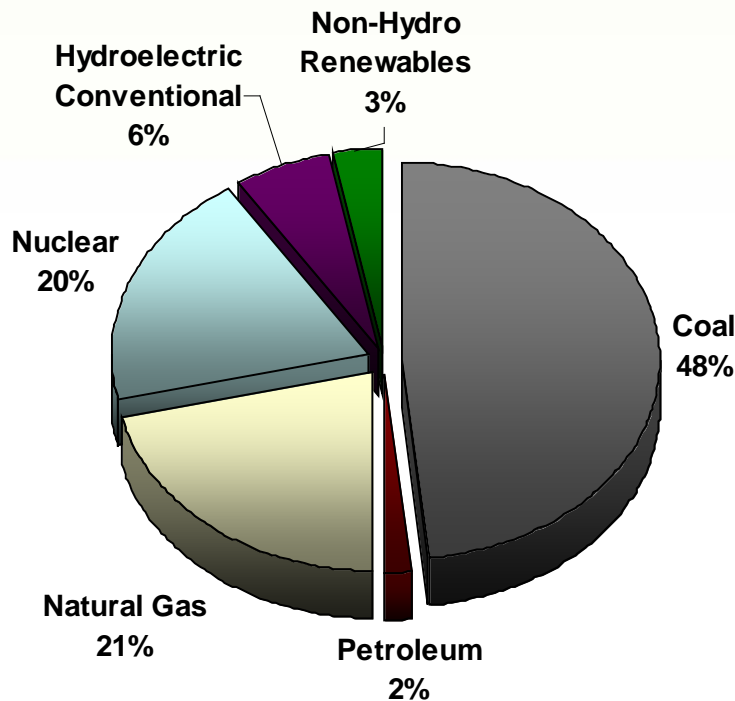
Colton Ching

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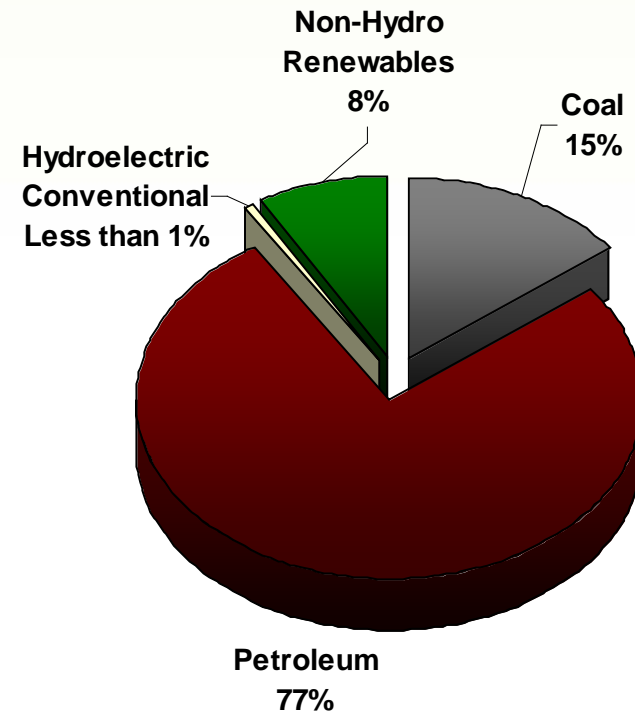
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Hawaii's Energy Issues are Fundamentally Different than the Mainland US

**U.S. Electric Power Industry
Net Generation, 2008**

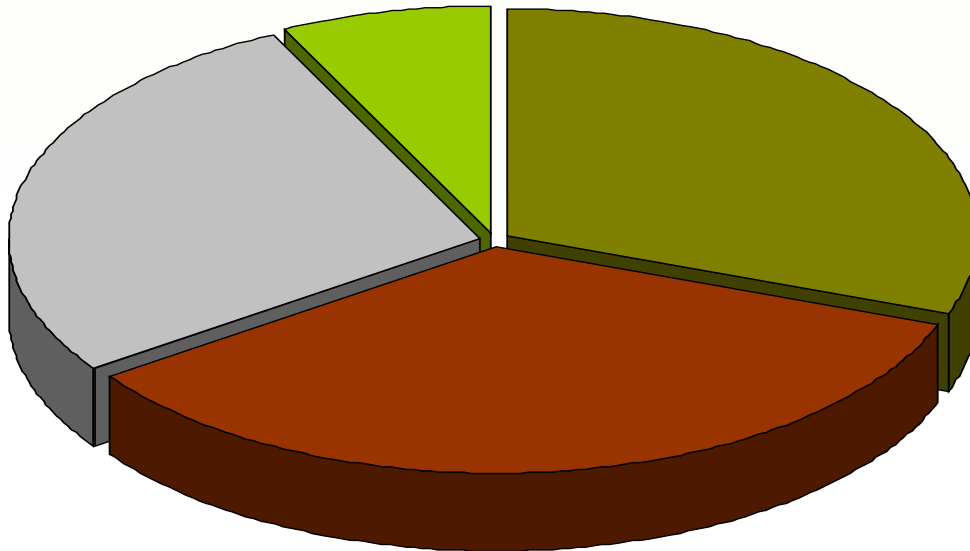


**HECO, HELCO & MECO
Net Generation, 2008**



Hawaii's Energy Use Today

**Primary energy: 90% fossil fuel,
Imported crude oil refined:**



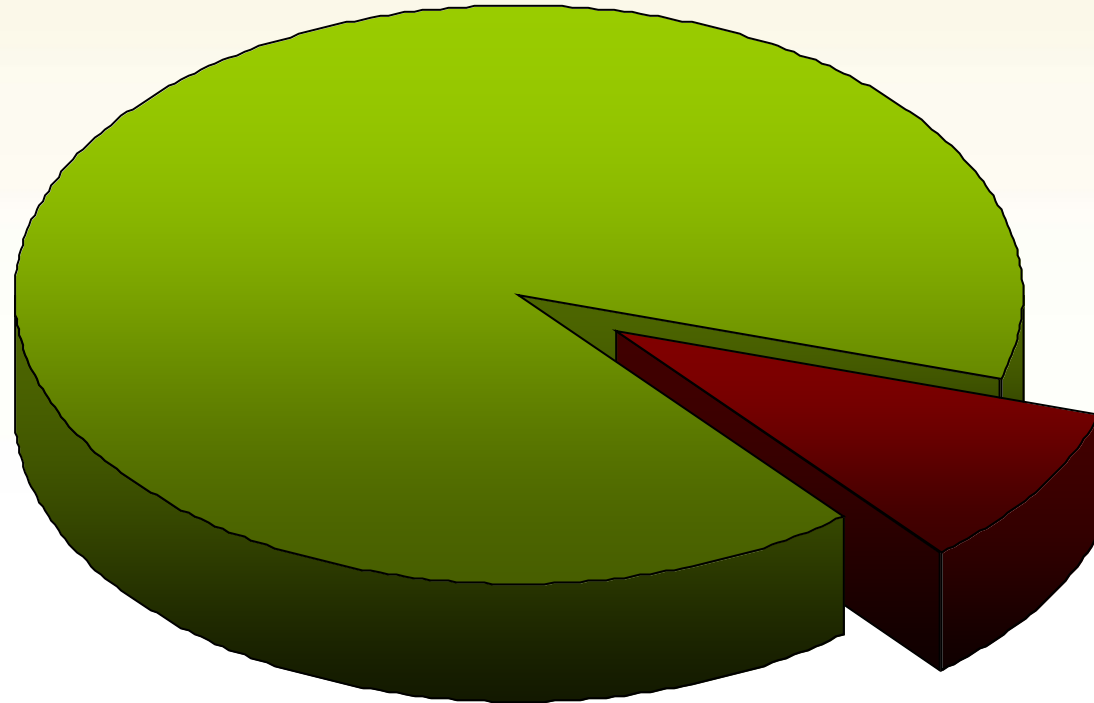
JET FUEL	34%
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ELECTRICITY	32%
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GASOLINE/ MARINE FUEL	27%
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OTHER	7%
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Hawaii's Economy in 2007



GROSS STATE PRODUCT	\$61.5 BILLION
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SPENDING ON ENERGY	\$ 6.2 BILLION
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A Paradigm Shift is Required

- Economic drain > Economic engine
- Energy insecurity > Energy security
- Environmental harm > Environmental compatibility
- Price volatility > Price stability



Where We Are Today?

State Law

■ Renewable Portfolio Standard (RPS)

- 10% by 2010
- 15% by 2015
- 25% by 2020
- 40% by 2030

■ Energy Efficiency Portfolio Standards (EEPS)

- 4,300 GWh reduction by 2030 (roughly 30%)

As of 2008

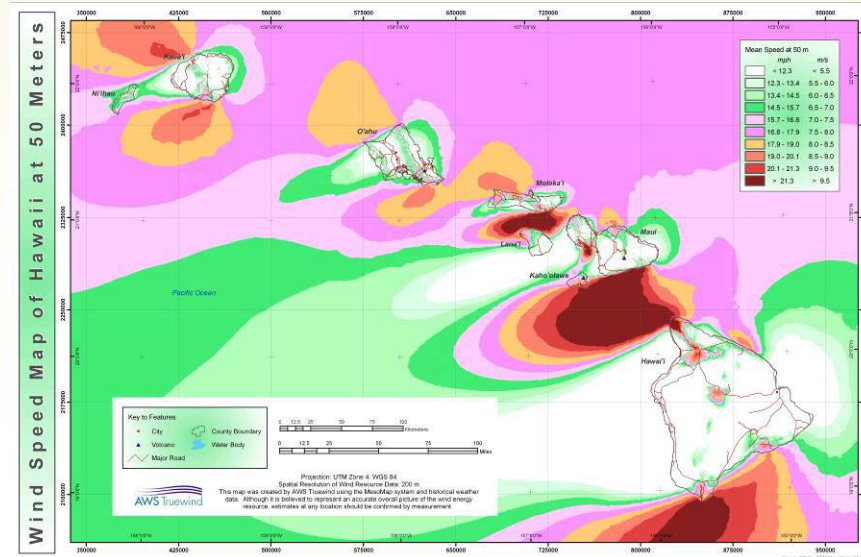
■ Renewable Portfolio Standard (RPS)

- 18% (incl. RE and EE)
- About ½ from RE
- About ½ from EE & displacement



Intermittent Renewable Generation is a Major Component of Our Generation Portfolio

- Rich wind and good solar resources
- An “indigenous” energy source
- Cutting edge in integrating intermittent renewable generation with island grids



Hawaii Island – 29% of peak load
Lanai – 26% of peak load
Maui – 17.3% of peak load

Leading Wind Penetration Levels

Power System Region	Maximum Wind Power Lowest Consumption + Export Capacity
West Denmark	58%
Schleswig Holstein (Germany)	44%
Gotland (Sweden)	40%
HELCO	39%
MECO	38%
Ireland	38%

*source of data for regions other than HELCO and MECO, from "Wind Power Integration in EirGrid Operating Experience", Jody Dillon, Renewables Integration Group, presented at the Utility Wind Interest Group conference in Fort Worth, Texas, April 2008

How We Can Move Ahead: Technical

- Grid transformation
- Liquid fuels substitute
- Inter-island connection



How We Can Move Ahead: Customer Acceptance

- Changing habits
 - Utility dispatch of Nega-Watts
- Trade-offs
 - Upfront costs for investments
 - Long-term price stability
- Statewide economic benefits



How We Can Move Ahead: Societal

- Government partnerships
- Customer education & partnerships
- Non-utility partnerships



Regulation Must Support Energy Objectives

- Decoupling
- Grid investment
- Financially sound utility



Island Interconnections

- ‘Big Wind’ – Lanai & Molokai wind farms
 - 200 MW each
 - Undersea cable to Oahu
- Future extension to Maui Island & Hawaii Island

Ambitious plan for wind power

UNDERSEA CABLE TO POWER O'AHU

Gov. Linda Lingle outlined plans in one possible scenario to build an undersea cable that connects O'ahu, Maui, Molokai and Lanai to carry wind-generated electricity to O'ahu.

Here are some of the 20 1.5-megawatt turbines at the new Kahaeas wind farm built on the West Maui Mountains.

400 MW

HECO will purchase about 400 megawatts of electricity produced by wind farms on Lanai and Molokai.

ONE-THIRD

Wind power would supply about a third of O'ahu's electricity needs under the deal between HECO and the state.

State officials, HECO sign a deal they say could save us billions

BY RICK DAYBOO
Advertiser Staff Writer

About a third of O'ahu's electricity needs could someday be met by wind farms, under a sweeping agreement signed yesterday by state officials and Hawaiian Electric Co.

Gov. Linda Lingle said the accord will help reduce the state's dependence on foreign oil, improve the reliability of HECO's electrical system and boost the state economy by keeping hundreds of millions of dollars in Hawaii that would otherwise be sent to foreign oil producers.

"This agreement is historic. It's transformational, and it will make Hawaii a world leader in renewable energy," Lingle said.

But critics say the plan would be costly for consumers and relies too heavily on wind power at the expense of cheaper technologies such as solar energy.

"It's a bunch of hot air," said Henry Curtis, executive director of the environmental group Life of the Land Hawaii.

Lingle, U.S. Sen. Daniel K. Inouye, Constance Lan, chief executive officer of HECO's parent, Hawaiian Electric Industries Inc., and other state officials were on hand at the state Capitol yesterday to sign the 50-page agreement, which is part of the Lingle administration.

See a video of officials announcing the plan for wind power at HONOLULUADVERTISER.COM

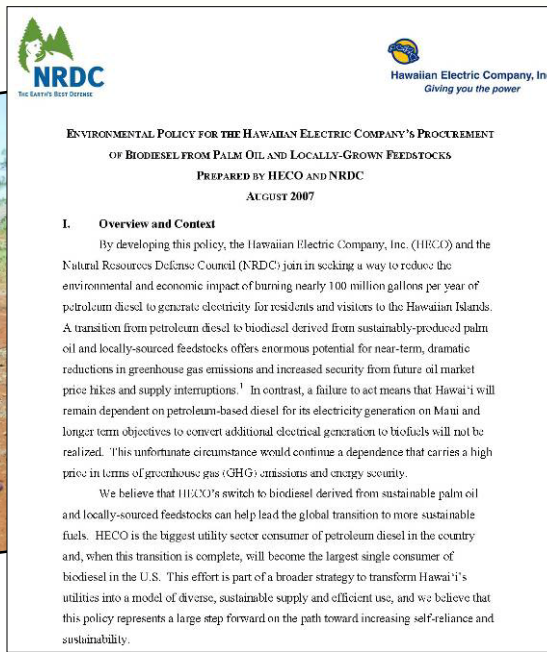
2028?

The Lingle administration's goal is to have 70 percent of O'ahu's energy needs supplied by renewable sources by 2028.

SEE WIND, A2

Sustainable Liquid Fuels

- Sustainable Biofuels
 - Work with Natural Resources Defense Council
- Compatible with local agriculture
- Testing on Oahu and Maui



Jatropha

Liquid Renewable Fuels Substitution

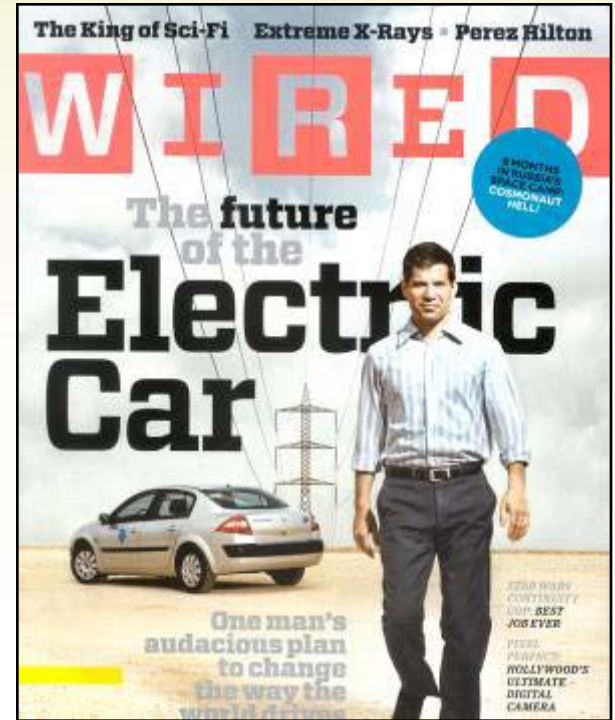
“Green for Black”

- Crude biofuel co-firing testing at Kahe Power Plant
- Biodiesel testing at Ma’alaea Power Plant
- Leverage existing investments
- New biofueled generation at Campbell Industrial Park
- Assist with integration of solar and wind energy



Electrifying Transportation

- 1/3 of oil imported for ground transportation
- Driving electric vehicles
 - can be cheaper
 - and cleaner (less CO₂)



Electrifying Transportation

- Hawaiian Electric working with EV companies
 - Better Place; Phoenix Motorcars; Idaho National Laboratory (hybrid conversion to plug-in hybrid) for HECO and MECO; other EV and equipment manufacturers

Star Bulletin
WEDNESDAY, DECEMBER 3, 2008 • HAWAII'S OLDEST DAILY NEWSPAPER, SINCE 1882 • 30c

IT'S ELECTRIC!

A Gokwira firm proposes to jump-start electric car use in Hawaii

By 2012, Hawaii is poised to become a national leader in electric car use under an ambitious plan announced yesterday by Gov. Linda Lingle.

Paul Aho, CEO of Better Place, has proposed a \$1 billion plan to build through private investments that would include up to 300,000 charging stations around Hawaii and provide state incentives for thousands of electric car buyers in the next several years.

"It is the first statewide project of its kind, and follows a similar outline announced last month in San Francisco."

"Better Place is a great first step in the right direction," Sen. Daniel Hironaka said in a statement. "Let us not fall behind in providing state support for this important initiative."

Under the plan, which might include government incentives for customers to buy electric vehicles, drivers would pay up to 8 cents a mile to use electricity through Better Place under a subscription plan similar to that of a cell phone contract.

The plan is part of the state's Clean Energy Initiative, which provides that 70 percent of power come from clean energy sources by 2030.

"Our goal is 1.5 million cars in Hawaii all going electric," said Shai Aguri, founder and chief executive of Better Place.

WHERE'S THE LINGLE?
Better Place's plan is getting about from President-elect Obama's economic recovery plan.

NRDC
Environmental Assessment of Plug-in Hybrid Electric Vehicles
Volume 1: Nationwide Greenhouse Gas Emissions

The cover features a stylized image of a car with a green and blue color scheme, set against a background of wind turbines and a city skyline.

SERVICE POSSIBLE BY 2011
State teams with electric car company

BY ANDREW GREENE
HONOLULU NEWS

A California technology company working to establish a \$1 billion statewide charging network for electric cars signed an agreement yesterday with Hawaiian Electric Co. to make such a contract possible as early as 2011.

The agreement, combined with a recommendation by Gov. Linda Lingle to help the venture with regulatory approvals, significantly advances the plan announced in October by Paul Aho, California-based Better Place.

"This is really, really groundbreaking," said William Parks, a deputy assistant secretary with the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability.

The system intends to draw and sell power from Hawaii's growing industry of renewable energy providers and would help Hawaii's break its \$7 billion a year addiction to fossil fuels.

Better Place so far has partnered with Nissan and Renault to provide electric cars for the mass market and is negotiating with other major car makers. Nissan and Renault are expected to begin selling electric vehicles capable of traveling 124 miles on a single charge in a price equal to conventional cars in 2010.

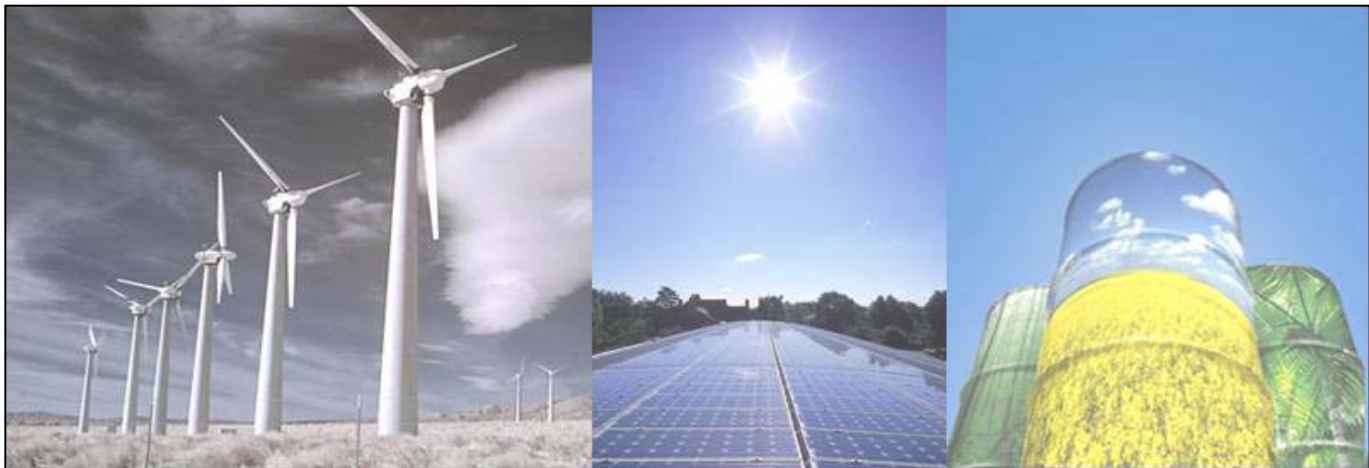
Rolling the electric rollout begins at what

DEBBY YAMAMOTO, the Honolulu-based CEO of Better Place, all but the electric components to build the world's first commercial Nissan-Rangeo EV by Linda Lingle, who took the vehicle for a short, five-minute

302 ELECTRIC 03

Summing it Up: Our Opportunity to Lead

- Hawaii electricity sector is different from the US Mainland
- Unique electricity strategy
- Economic necessity
- Security necessity
- Environmental necessity
- Hawaii is an ideal 'lab' to prove concepts like biofuels & EVs





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